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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
Division of Forest Insect Investigations

# WORK PLAN
For
# THE CONTROL OF THE LODGEPOLE PINE NEEDLEMINER IN YOSEMITE NATIONAL PARK BY AERIAL APPLICATION OF DDT

## INTRODUCTION

The lodgepole pine needleminer, Recurvaria milleri Busck., has periodically caused serious defoliation of lodgepole pine in the Yosemite National Park. The extensive "ghost" forests in the Tuolumne Meadows area are believed to have been caused by serious needleminer defoliation followed by attacks by the mountain pine beetle. The 1952 survey of insect conditions in the Park showed extensive areas of lodgepole pine heavily defoliated by the needleminer in the vicinity of Tenaya Lake, Virginia Canyon and Jack Main Canyon. It was estimated from the air that there was approximately 45,000 acres affected. The Berkeley Forest Insect Laboratory in a report1/ on the situation recommended control of this insect through the aerial spraying of one pound of DDT in one gallon of diesel oil per acre in the area of highest recreational use during the summer of 1953. A pilot-plant type of operation was specified because there was some uncertainty as to the effectiveness of this type of control. A joint meeting of Park Service and Bureau Personnel was held on November 7 and again on January 13 to discuss the size of the area which would be sprayed. It was finally agreed that control would be attempted on 8 to 10 thousand acres of the high-use areas in the vicinity of Tenaya Lake and Tuolumne Meadows. It is proposed that the control project be executed in accordance with the plan outlined herein.

## Control Objectives

The primary objective of the project is to control the needleminer in the portion of the infested area that is of greatest recreational value. It is anticipated that this can be done by spraying at about the time that the eggs hatch, since it is expected that the young larvae will succumb to the residual action of the spray when they are migrating to the needles for initial attack.

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1/ Forest Insect Conditions, Yosemite National Park - October 1952 by R. E. Stevens. 11/19/52. Forest Insect Laboratory, Berkeley, California

## Plan of Work

The following sections cover methods to be employed, equipment needed, records to be taken, location of the work, time schedule, and cooperation.

### Methods to be Employed

A multiengined airplane equipped with a spray boom, and capable of producing a spray with an average droplet size of from 150 to 300 microns, has been specified for this job. The height of spray release will be from 250 to 400 feet above treetop level. The width of strip sprayed will depend largely on the wing span of the plane used and will be determined after the contract for spraying has been let.

The insecticide will be an oil solution of DDT containing 1 pound of DDT, 1.25 quarts of auxiliary solvent plus sufficient fuel oil to make one gallon of spray. It will be applied at a rate of 1 gallon of finished spray per acre. The spray will be delivered at Merced and stored there pending the selection of an airport suitable as an operating base. The selection will be made at a later date in cooperation with the successful bidder to best meet the needs of the ship which is used for this job.

### Method of Evaluating the Spray

The method of evaluating the effects of the spray will be to compare the population of lodgepole needleminer larvae in the sprayed area with that in a comparable unsprayed area before and after treatment. The pre-spray samples will be taken before the adult moths emerge in July 1953, and the post-spray samples will be taken prior to the first migration of the young larvae which occur approximately one year hence. A method of sampling the larval population has been designed to yield results with a sampling error of not more than 15 per cent at the 95 per cent confidence level.

The distribution of spray and particle size will be obtained by the use of sensitized jump cards distributed at random throughout the treated area.

### Location of the Area

The area to be treated is in the vicinity of Tenaya Lake and Tuolumne Meadows. The specific boundaries will be delineated sometime in early July after a field appraisal of conditions.

## Equipment and Materials Needed

The following material and equipment will be needed for this job:

Spray material - 10,000 gallons of DDT spray will be needed. Specifications call for this to be delivered in 55 gallon drums.

Storage tank - A storage tank which will hold a plane load of spray should be available at the airport.

Loading pump - If the successful bidder does not have loading equipment, this must be supplied at the airport.

Radios - It would be highly desirable to have radio contact from the airport to the treated area and from the plane to ground, as well as radio contact between flagmen.

Flags - Two white or fluorescent colored flags about 4x4 feet dimension will be needed for the flagmen.

Maps - Several topographic maps of Yosemite National Park will be needed for this project. In addition, duplicate sets of aerial photos will be needed for all of the area to be treated. These are in the Forest Service 1944 flight DDE.

Weather equipment - A temporary weather station will be established in some central location within the control zone. This should be equipped with a hygrothermograph, maximum-minimum thermometer and anemometer of the buzzer type so that wind movement can be calculated at any desired time (the Forest Insect Laboratory can supply this equipment if necessary).

## Records to be Taken

Weather records of temperature, humidity and wind movement will be maintained just prior to and during actual spray applications at intervals of 30 minutes.

A pictorial record is planned to show all phases of the control program to include pictures of the terrain, infested trees, stages of the insects, plane at rest and in action, loading operations, etc.

A daily flight record will be kept of the project on an airplane time report form. These records will be kept so that it will be possible to determine the total net time in the air, the amount of spray material carried for each load and approximate acreage covered per load.

## Automotive Equipment

A stakeside truck, and a radio equipped pick-up should be available on this job for the duration of the project. This is in addition to the equipment needed to transport the spray material to the airport.

Manpower

Two flagmen and a man to assist with spray loading will be needed during the progress of the actual spray application.

Time Schedule

The tentative time schedule for this project will be about August 15. The actual scheduling of spraying operations will depend upon the development of the insects. The rate of development will be determined in biological studies to be carried on by the Bureau.

Cooperators

This is a cooperative project between the U. S. Park Service and the Forest Insect Laboratory. The Park Service will provide all needed materials, equipment, and manpower for flagging and loading. The Forest Insect Laboratory will make the appraisal surveys, outline the areas to be sprayed, determine when the spray is to be applied, provide technical supervision of spraying operations, and check on the effectiveness of the treatment.

Forest Insect Laboratory
Berkeley, California
June 16, 1953

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